Two deep-water species of mollusks (Gastropoda: Costellariidae) from the southwestern Gulf of Mexico with the description of a new species

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KEYWORDS. Gastropoda, Costellariidae, *Vexillum*, *Costellaria*, *Mitromica*, Campeche, Mexico, Yucatan, Gulf of Mexico, deep water.

ABSTRACT. A new Costellariidae species is described herein and compared with its closest congener; and a *Mitromica* species, possibly representing a geographic extension of *Mitromica dicksoni* Rosenberg & Salisbury, 2003, is discussed. Both species were dredged in deep water in Campeche Bay, southwestern Gulf of Mexico.

INTRODUCTION. Deep-water dredging in the Gulf of Mexico has provided samples of a number of small costellarid species in recent years. The Biology Department at the University of Louisiana at Lafayette has conducted a series of dredging cruises in the Gulf of Mexico (García, 2007). An important objective of these cruises was to obtain a better understanding of the biodiversity of the Gulf. This objective has been largely met with the methodical study of the material collected, particularly the micro-mollusks extracted from the sediment. The dredged material has brought to light many molluscan species previously unrecorded for that body of water as well as a number of previously undescribed species. All cruises were conducted on board the R/V "Pelican", a research vessel owned and operated by LUMCON, the Louisiana Universities Marine Consortium. Many specimens were collected due to the availability of grants and research ships.

During this operation, which took place from 4 June until 23 June 2003, a total of 116 dredge hauls were made. Most dredge hauls were made from relatively deep water of 50 to 114 meters. Approximately 440 species of Bivalvia, Scaphopoda and Gastropoda, belonging to 90 families were collected. During the late Miocene and early Pliocene, the Caribbean was a tropical sea filled with many diverse gastropods. The Costellariidae were well represented with over 20 fossil species known. Many of these species were described by Julia Gardner (1937). With the emergence of Central America and the closure of the connection between the Eastern Pacific and the Caribbean, most of the Costellariidae became extinct. Besides one fossil species described by Holmes, 1860, this new species is one of only a few small costellarid species that have survived into Recent times in the Caribbean Sea.

Abbreviations

ANSP: Academy of Natural Sciences, Philadelphia, Pennsylvania, USA.
BMNH: Natural History Museum, London, England.
BMSM: Bailey-Matthews Shell Museum, Sanibel, Florida, USA.
EFG: Emilio F. García collection, Lafayette, Louisiana, USA.
JW: John Wolff collection, Lancaster, Pennsylvania, USA.
NSF: National Science Foundation.
RAS: Richard Salisbury collection Meridian, Idaho, USA.
SBMHN: Santa Barbara Museum of Natural History, Santa Barbara, California, USA.
USNM: National Museum of Natural History, Smithsonian Institution, Washington, DC, USA.

SYSTEMATICS

Family **COSTELLARIIDAE** MacDonald, 1860
Genus ***Vexillum*** Röding, 1798
Subgenus ***Costellaria*** Swainson, 1840
Type species by monotypy: *Mitra rigida* Swainson, 1821 = *Mitra semifasciata* Lamarck, 1811 = *Vexillum* (*Costellaria*) *semifasciatum* (Lamarck, 1811) Recent, Indo-Pacific.

Vexillum* (*Costellaria*) *garciai n. sp.
Figs. 1-7

Holotype (Figs. 1-5): 144 miles NW of Campeche, Mexico (20°51.49' N; 92°21.44' W). Size, length 6.8

mm, width 2.3 mm, aperture 3.2 mm. Dredged, in mud, 63-65 meters, NSF II 36, June 2003, lot 26309-1. ANSP 419159.

Additional Type Material (see Table 1)

Paratypes 1-10
144 miles NW of Campeche, Mexico (20°52.40' N; 92°24.83' W). Dredged, in mud, 77-81 meters, NSF II 35, June 2003, lot 26308.
Paratypes 11-20
144 miles NW of Campeche, Mexico (20°51.49' N; 92°21.44' W). Dredged, in mud, 63-65 meters, NSF II 36, June 2003, lot 26309.
Paratypes 21-33
120 miles NW of Isla de Carmen, Mexico (20°00.35' N; 92°26.10' W). Dredged, in sand, 73-77 meters, NSF II 45, June 2003, lot 26313.

Type locality. 144 miles NW of Campeche, Mexico (20°52.40' N; 92°24.83' W), in sand and mud, 63-81 meters

Distribution. Known only from the area approximately 140 miles (225 km) northwest of Campeche, Mexico

Etymology. Named in honor of Dr. Emilio García for his dedicated work in identifying and classifying the deep-water molluscan material from the Gulf of Mexico.

Description. Shell tiny, up to 7.1 mm in length, elongate-fusiform, rather thin, smooth, shiny; protoconch mamillate (Fig. 4), consisting of 2 to 2½ smooth, slightly convex, transparent, glassy white or light yellow embryonic whorls. Teleoconch of 5 convex whorls; sutures distinct, deeply impressed; whorls with shelf near the suture; there is a faint, indistinct subsutural spiral groove intermittently bisecting ribs; dominant sculpture formed by slender, smooth, wavy axial ribs which number 13-17 on the early whorls, 21-23 on the body whorl; ribs remain strong on the dorsal side of body whorl; axial ribs terminate with a nodule near suture (Fig. 5); shell characterized by smooth U-shaped interstitial areas between the axial ribs; siphonal fasciole sculptured with 3 or 4 flat, oblique spiral cords. Aperture much shorter than spire, with 8-10 weak lirations deep within the outer lip, some specimens lack visible lirations; outer lip simple and smooth; siphonal canal short, wide; columella with four weak columellar folds (teeth) decreasing in size abapically (Fig. 3); columellar folds stained brown in some specimens. Color pattern frosty white, yellow, light pink or light orange; siphonal fasciole, aperture and columella white.

Discussion. *Vexillum* (*Costellaria*) *garciai* n. sp. (Figs. 1-6), resembles the Caribbean species *V.* (*C.*) *wandoense* (Holmes, 1860) (Figs. 8-9). *V.* (*C.*) *wandoense* is sculptured with very fine spiral striae between the axial ribs, has a lower portion of the body whorl with finely beaded spiral cords, a mamillate protoconch of 1½ glassy brown whorls and a teleoconch of 4 whorls in an adult shell. In contrast, *V.* (*C.*) *garciai* is shiny, semi-transparent white, sculptured with thin, wavy axial ribs (Fig. 5) with very smooth U-shaped interspaces and has a protoconch of 2½ glassy white whorls (Fig. 4). This new species is larger than *V.* (*C.*) *wandoense*, and has 5 whorls in adult shells. It should be noted that in the majority of specimens studied the lirations within the aperture were not visible. Only a few specimens (see Figs. 6-7) have prominent lirations visible in the aperture. In rare cases the columellar folds (Fig. 3) are stained brown.
Vexillum (*C.*) *garciai* undoubtedly had a Miocene-Pliocene fossil relative from which it descended. The majority of the Caribbean Costellariidae fossil species are heavily sculptured between the axial ribs, unlike the smooth sculpture of this new species. Gardner, 1937 described two species which are similar to *V.* (*C.*) *garciai*. *Vexillum* (*Uromitra*) *triptum* is reported to have only 14 axial ribs on the body whorl compared to 21 to 23 on this new species. *V.* (*U.*) *mikkulum* differs in being sculptured with 9 to 12 axial ribs on the body whorl with V-shaped interspaces between the axial ribs.
Gardner (1937) suggested that many of these small costellarid fossil species might have lived in sandy habitats in shallow water. This new species is found in moderately deep water (63 to 81 meters) in sand and mud habitats.

Figures 1- 14

1-7. *Vexillum (Costellaria) garciai* n. sp.
1-5. *Vexillum (Costellaria) garciai* n. sp. **1-2.** Holotype, 144 miles NW of Campeche, Mexico. 6.8 mm, ANSP 419159.**3.** Close-up of aperture. **4.** Close-up of early whorls and protoconch. **5.** Close-up of body whorl sculpture: **6-7.** *Vexillum (Costellaria) garciai* n. sp. Paratype no. 5, shell and close-up of lirations in the aperture, 5.3 mm.
8-9. *Vexillum (Costellaria) wandoense* (Holmes, 1860), St. John's Pass, Florida, USA, 5.6 mm.
10-12. *Mitromica* sp. cf *M. dicksoni,* 185 miles NW of Campeche, Mexico, 7.4 x 2.5 mm. Dredged in mud & shells, 66-68 meters, EFG 25969. 12. close-up of early whorls and protoconch.
13-14. *Mitromica dicksoni* Rosenberg & Salisbury, 2003. Holotype, northeast of Contoy Light, Yucatan, Mexico, 7.3 mm, ANSP 408308.

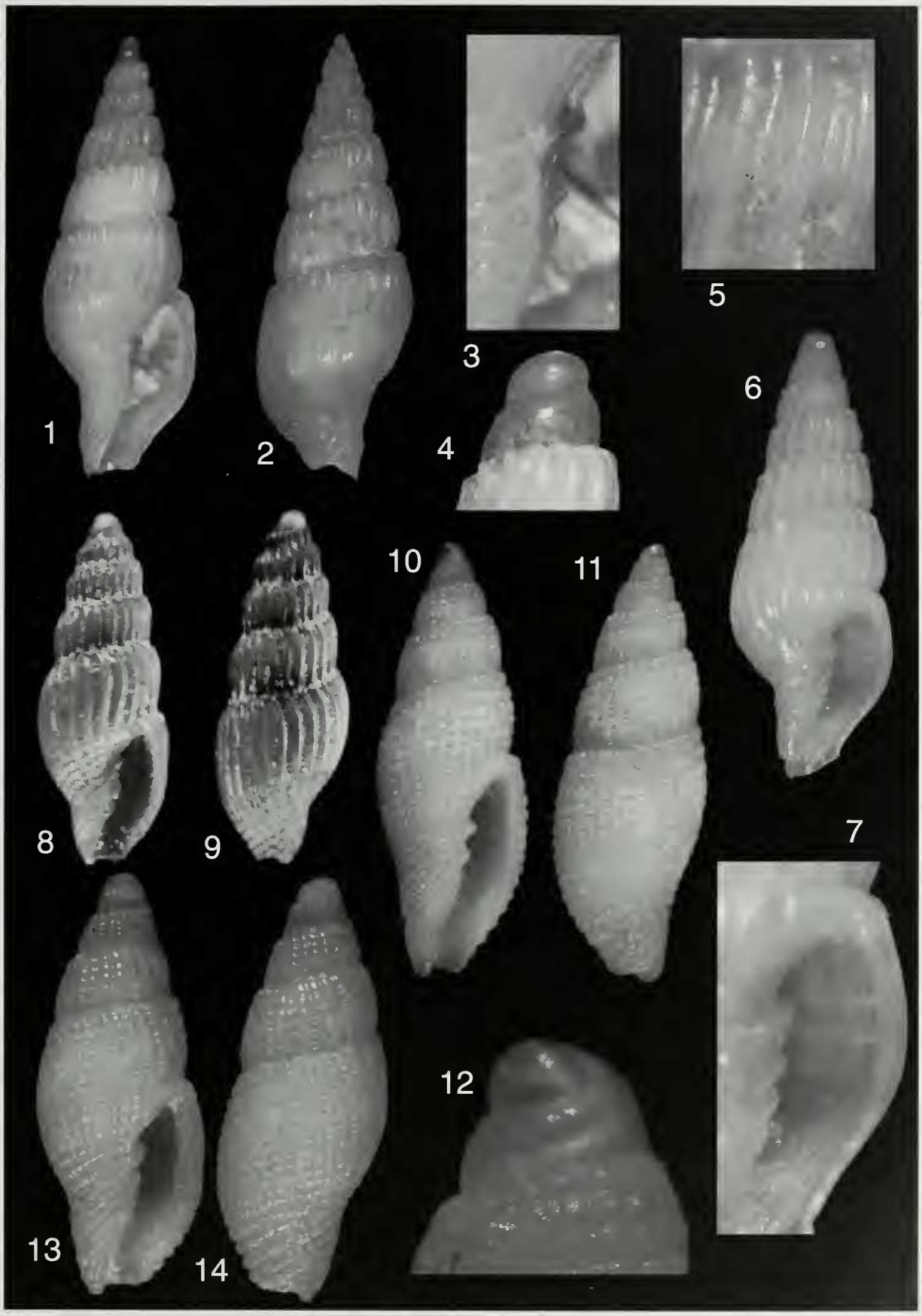
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TABLE 1

Paratypes Lot 26308	length	width	aperture length	Collection
-1	5.5	2.0	2.3 mm	EFG 26308
-2	4.4	1.7	2.1 mm	EFG 26308
-3	4.1	1.6	1.9 mm	EFG 26308
-4	4.6	1.6	1.9 mm	EFG 26308
-5	5.3	1.9	2.3 mm	EFG 26308
-6	5.0	1.9	2.2 mm	EFG 26308
-7	4.9	1.9	2.2 mm	JW
-8	4.8	1.8	2.2 mm	EFG 26308
-9	4.5	1.8	2.2 mm	EFG 26308
-10	4.3	1.7	1.9 mm	EFG 26308
Lot 26309 Paratypes				
-11	6.1	2.2	3.0 mm	ANSP 419160
-12	6.4	2.3	3.1 mm	USNM 1121022
-13	5.8	2.2	2.8 mm	EFG 26309
-14	5.6	2.2	2.4 mm	EFG 26309
-15	4.7	1.7	2.3 mm	EFG 26309
-16	7.1	2.5	3.2 mm	BMNH 20080639
-17	7.0	2.5	3.2 mm	EFG 26309
-18	6.9	2.5	3.2 mm	EFG 26309
-19	6.7	2.4	3.2 mm	EFG 26309
-20	6.1	2.2	2.9 mm	EFG 26309
Lot 26313 Paratypes				
-21	6.2	2.2	3.1 mm	RAS
-22	5.8	2.1	2.8 mm	EFG 26313
-23	5.7	2.0	2.7 mm	EFG 26313
-24	5.2	1.8	2.5 mm	EFG 26313
-25	5.0	1.8	2.3 mm	EFG 26313
-26	4.7	1.8	2.0 mm	EFG 26313
-27	4.6	1.7	1.9 mm	EFG 26313
-28	5.7	2.1	2.5 mm	BMSM 38478
-29	5.3	1.9	2.6 mm	SBMNH 83536
-30	5.2	1.9	2.6 mm	EFG 26313
-31	5.3	2.0	2.6 mm	EFG 26313
-32	5.0	1.9	2.5 mm	EFG 26313
-33	5.0	1.9	2.4 mm	EFG 26313

Genus ***Mitromica*** Berry, 1958

Mitromica* sp. cf *M. dicksoni
Rosenberg & Salisbury, 2003
Figs. 10-12

Material examined. One specimen, size: 7.4 x 2.5 x 3.6 mm
185 miles NW of Campeche, Mexico (21°51.32'N; 92°03.68'W). Dredged in mud & shells, 66-68 meters, NSF 11 66, EFG 25969
One specimen (fragment) size: 7.0 x 3.0 x 4.1 mm
150 miles NW Campeche, Mexico (20°52.40' N; 92°24.83' W). Dredged in mud, 77-81 meters, NSF II 35, EFG 26312

Discussion. One intact specimen and a large fragment of *Mitromica* cf *M. dicksoni* Rosenberg & Salisbury, 2003 (Figs. 10-12) were discovered in the Campeche dredge hauls. Both examples appear to be conspecific. Rosenberg & Salisbury 2003 separated the Caribbean *Mitromica* species from *Thala* based on growth patterns of these two different groups. *Thala* have episodic growth with denticles present even in juveniles, whereas *Mitromica* have continuous growth with labral denticles found only in adult shells.
Mitromica dicksoni Rosenberg & Salisbury, 2003 (Figs. 13-14, holotype) was described from two worn specimens from the type locality, northeast of Contoy Light, Yucatan, Mexico, in 68 meters. The holotype is a thick shell with 4 distinct columellar folds, and

measures 7.3 x 2.9 x 2.6 mm. The color is faded to white. The *Mitromica* specimen illustrated in this paper was collected 555 kilometers away from the type locality of *Mitromica dicksoni* and measures7.4 mm. The holotype of *M. dicksoni* is more obese and worn and appears slightly smoother, with 33 to 36 axial ribs and 23 spiral cords on the body whorl. The specimen illustrated herein has 30 or 31 axial ribs on the body whorl and 20-22 spiral cords. The color pattern is white with a few indistinct white nodules forming large milky white maculate areas on the body whorl. The protoconch is mamillate consisting of 2 white, glassy whorls (Fig. 12). The study of additional specimens of *M. dicksoni* will be needed to conclusively determine if these *Mitromica* specimens represent a new range extension for this species.

Acknowledgements.

Dr. Emilio García for loan of study material. The material for this study is based upon work supported by the National Science Foundation under Grant No. 0315995.

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